REMARKS

In the Office Action mailed January 14, 2003 the Examiner noted that claims 1-3, 6, 7 and 11-13 were pending, that claims 4-5, 8-10, and 15 have been withdrawn from consideration, and rejected claims 1-3, 6, 7 and 11-13. Claim 1 has been amended, new claim 15 has been added and, thus, in view of the forgoing claims 1-3, 6, 7, 11-13 and 15 remain pending for reconsideration which is requested. No new matter has been added. The Examiner's rejections are traversed below.

Page 2 of the Office Action rejects claims 1-3, 6, 7 and 11-13 under 35 U.S.C. § 103 over 5,787,215 Kuhara in view of 5,963,696 Yoshida maintaining the rejection over the same references as in the prior Office Action.

The claims emphasize that the invention has a laser diode assembly that includes a holder with an axis and a sleeve that has an axis. The invention also has a lens fiber assembly that includes a casing and a ferrule. In particular, the casing has two holes where the casing holes each have an axis and the axes are offset. Thus, the claims make clear that the same member, the casing, (as opposed to the sleeve or holder) has two holes with axes that are offset. The Examiner acknowledged that Kuhara does not teach such casing holes with offset axes. As previously noted, the Examiner acknowledges that Yoshida has a holder with an axis and a sleeve with another axis that is offset. The Examiner argues that having a holder with an axis offset from a separate sleeve axis maximize power suggests the same body having holes that offset. It is submitted that the prior art does not teach or suggest a casing with hole axes that are offset.

The Examiner appears to be using hindsight in maintaining the rejection of the claims. As noted above, the current application disclosure teaches and the claims recite the offsetting of the axes of the holes in the same body (the casing) - see claims 1, 6, 11 and 15. Nothing in the prior art shows this. The Examiner is using the teaching of offsetting laser, lens and fiber to maximize power (see Yoshida, col. 15, lines 12-26) as a basis for asserting that the art suggests offsetting of the holes in a body that is the same body. However, the prior art (Yoshida) offsets for maximum power without having offsets in the same body and uses two bodies to accomplish the offset (the cap 7 and holder 16). That is, the prior art of Yoshida teaches that maximum

power can be accomplished in a different way without using offset holes in the same body. In other words, there is no suggestion for offsetting holes in the same body and the Examiner is using the current application teachings in hindsight to modify the prior art teachings. The prior art (Yoshida and Kuhara) can accomplish power optimization without realizing the manufacturing/assembly benefits of having the holes in the same body. There is no suggestion of offset holes in the same body (the casing) or a suggestion of the manufacturing benefits that accrue to such a casing. It is submitted that the claims distinguish over the prior art for this reason.

In addition the Examiner appears to be ignoring other important features of the claimed invention. The present invention positions the lens in the casing, which is the same body in which the ferrule is positioned (see claims 1, 6, 11 and 15). The prior art places the lens and ferrule in a separate bodies (a cap and holder or a conical housing and lens holder, respectively). It is important to properly align the ferrule and lens, and the present invention provides an alignment ease and consistency advantage over the prior art because the lens and ferrule are mounted in the same body. The Examiner appears to be ignoring this claim feature and advantage. It is submitted that the present invention is patentably distinguishable for this additional reason.

Another feature that the Examiner appears to be ignoring is that the holes of the casing have different diameters to fit the lens and the ferrule something, according that is needed if the lens and ferrule are fixed in the same body (see claims 1, 6 and 15). The Examiner appears to be ignoring this claim feature and advantage. It is submitted that the present invention is patentably distinguishable for this reason.

It is also important to align the slant face of the ferrule properly relative to the lens so that the proper entrance/incidence angle for the light into the end of the fiber 40 is attained. That is, the slant face must properly align with the two axes of the respective two casing holes. This is accomplished by providing an alignment guide in the form of a groove 50 and rail. Claim 1 has been amended to emphasize this additional feature. This rail groove insure proper alignment and improve ease of assembly. The prior art of Yoshida and Kuhara does not teach or suggest this feature or the benefits that are derived from this feature.

It is submitted that the invention of independent claims distinguishes over the prior art and withdrawal of the rejection is requested.

The dependent claims depend from the above-discussed independent claims and are patentable over the prior art for the reasons discussed above. The dependent claims also recite additional features not taught or suggested by the prior art. For example, claims 3 and 13 call for a third hole communicating with the space between the lens and the ferrule and a pin closing the hole. The Examiner argues that such would be obvious because of the cooling needed for the diode. The Examiner seems to be arguing that when the laser diode of this module gets hot, a person should remove the pin to cool the assembly. Typically, hundreds of theses modules are located throughout a communication system. Based on the Examiners allegations, we are to suppose that the communications company hires someone who goes around and removes the pins when the diodes gets hot. This seems impractical and appears to be missing the point of the third hole. The third hole is used during assembly to relieve pressure that could build up between the lens and the ferrule when the ferrule is inserted in to the casing after the lens is inserted or visa versa. Otherwise air pressure would build up in the space between the lens and the ferrule which could cause a failure. The third hole relieves this pressure and the pin closes the hole so air/dust will not get inside the casing after the module is assembled. The fact that the entire motivation for the hole has been misapprehended by the Examiner is evidence that the third hole is not obvious. It is submitted that the dependent claims are independently patentable over the prior art.

If any further fees, other than and except for the issue fee, are necessary with respect to this paper, the U.S.P.T.O. is requested to obtain the same from deposit account number 19-3935.

Respectfully submitted,

STAAS & HALSEY LLP

Date: 4/14/3

By: _____
J. Randall Beckers
Registration No. 30,358

700 Eleventh Street, NW, Suite 500
Washington, D.C. 20001
(202) 434-1500

CERTIFICATE UNDER 37 CFR 1.8(a)
I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231
on April 14, 2003
STAAS & HALSEY
By: L Tillman
Date: 4/14/03

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please AMEND the following claims:

1. (Amended) A laser diode module, comprising:

a laser diode assembly including a base, a carrier fixed to said base, a laser diode mounted on said carrier, a cap fixed to said base so as to surround said laser diode, and a holder fixed to said base so as to surround said cap and having a holder axis;

a lens-fiber assembly [including] comprising:

a casing having a first casing end, a second casing end, a first casing hole having a first casing hole diameter and a first casing hole axis, and a second casing hole having a second casing hole diameter smaller than said first casing hole diameter and a second casing hole axis offset from said first casing hole axis, said second casing hole communicating with said first casing hole and an alignment rail positioned in the first casing hole aligned parallel with the second casing hole axis,

a lens inserted and fixed in said first casing hole from said first casing end of said casing, and

a ferrule with an optical fiber embedded therein, said ferrule having a slant polished first ferrule end and a second ferrule end and an alignment groove fitting said alignment rail aligning said slant polished first ferrule end with said lens, said ferrule being inserted and fixed in said second casing hole from said second casing end of said casing using said rail and groove so that a given distance and alignment is defined between said first ferrule end of said ferrule and said lens and that said second ferrule end of said ferrule projects from said second casing end of said casing; and

a sleeve having a first sleeve end fixed to said holder and a second sleeve end to which said first casing end of said casing is fixedly inserted and having a sleeve axis;

said first end of said ferrule being positioned so that a portion of said first ferrule end of said ferrule radially farthest from said first casing hole axis of said first casing hole becomes axially farthest from said lens.

2. (Amended) A laser diode module according to claim 1, wherein the slant angle of said first ferrule end of said ferrule is set in the range of about 4° to about 8° with respect to a plane perpendicular to an axis of said ferrule.

3. (Amended) A laser diode module according to claim 1, wherein said casing further has a third casing hole for making communication of said first and second casing holes between said lens and said ferrule with the ambient air, and a pin for closing said third casing hole.

4. (Withdrawn) An assembling method for a laser diode module using a lens-fiber assembly including a casing having a first end, a second end, and a through hole, a lens inserted and fixed in said through hole, and a ferrule with an optical fiber embedded therein, said ferrule having a slant polished first end and a second end, said ferrule being inserted and fixed in said through hole so that a given distance is defined between said. lens and said first end of said ferrule, said assembling method comprising the steps of:

setting a laser diode assembly having a laser diode and a holder, a sleeve, and said lens-fiber assembly on an assembling jig;

optically connecting an optical power meter to said second end of said ferrule;

bringing a first end of said sleeve into contact with said holder, and inserting said first end of said casing into said sleeve from a second end thereof;

moving said lens-fiber assembly relative to said laser diode along an optical axis and in the directions perpendicular to said optical axis while monitoring the power of a laser beam emitted from said laser diode by using said optical power meter; and

welding said sleeve and said holder and welding said sleeve and said casing at a position where the reading on said optical power meter shows a maximum value.

5. (Withdrawn) An assembling method for a laser diode module using a lens-fiber assembly including a casing having a first end, a second end, a first hole having. a first diameter and a first axis, and a second hole having a second diameter smaller than said first diameter and a second axis offset from said first axis, said second hole communicating with said first hole, a lens inserted and fixed in said first hole from said first end of said casing, and a ferrule with an optical fiber embedded therein, said ferrule having a slant polished first end and a second end, said ferrule being inserted and fixed in said second hole from said second end of said casing so that a given distance is defined between said first end of said ferrule and said lens and that said

second end of said ferrule projects from said second end of said casing, said assembling method comprising the steps of:

setting a laser diode assembly having a laser diode and a holder, a sleeve, and said lens-fiber assembly on an assembling jig;

optically connecting an optical power meter to said second end of said ferrule;

bringing a first end of said sleeve into contact with said holder, and inserting said first end of said casing into said sleeve from a second end thereof;

moving said lens-fiber assembly relative to said laser diode along an optical axis and in the directions perpendicular to said optical axis while monitoring the power of a laser beam emitted from said laser diode by using said optical power meter; and

welding said sleeve and said holder and welding said sleeve and said casing at a position where the reading on said optical power meter shows a maximum value.

6. (Amended) A laser diode module, comprising:

a laser diode assembly including a base, a carrier fixed to said base, a laser diode mounted on said carrier, a cap fixed to said base so as to surround said laser diode, and a holder fixed to said base so as to surround said cap and having a holder axis; and

a lens-fiber assembly including a casing having a first casing end, a second casing end, a first casing hole having a first casing hole diameter and a first casing hole axis, and a second casing hole having a second casing hole diameter smaller than said first casing hole diameter and a second casing hole axis offset from said first casing hole axis, said second casing hole communicating with said first casing hole, a lens inserted and fixed in said first casing hole from said first casing end of said casing, and a ferrule with an optical fiber embedded therein, said ferrule having a slant polished first ferrule end and a second ferrule end, said ferrule being inserted and fixed in said second casing hole from said second casing end of said casing so that a given distance is defined between said first ferrule end of said ferrule and said lens and that said second ferrule end of said ferrule projects from said second casing end of said casing;

said first casing end of said casing being fixed to said holder;

said first ferrule end of said ferrule being positioned so that a portion of said first ferrule end of said ferrule radially farthest from said first casing hole axis of said first casing hole becomes axially farthest from said lens.

7. (Amended) A laser diode module according to claim 6, wherein the slant angle of said

first ferrule end of said ferrule is set in the range of about 4° to about 8° with respect to plane perpendicular to an axis of said ferrule.

8. (Withdrawn) An assembling method for a laser diode module using a lens-fiber assembly including a casing having a first end, a second end, and a through hole, a lens inserted and fixed in said through hole, and a ferrule with an optical fiber embedded therein, said ferrule having a slant polished first end and a second end, said ferrule being inserted and fixed in said through hole so that a given distance is defined between said lens and said first end of said ferrule, said assembling method comprising the steps of:

setting a laser diode assembly having a laser diode and a holder and said lens-fiber assembly on an assembling jig;

optically connecting an optical power meter to said second end of said ferrule;

bringing said first end of said casing into contact with said holder;

moving said lens-fiber assembly relative to said laser diode in the directions perpendicular to an optical axis while monitoring the power of a laser beam emitted from said laser diode by using said optical power meter; and

welding said casing and said holder at a position where the reading on said optical power meter shows a maximum value.

9. (Withdrawn) An assembling method for a lens-fiber assembly, comprising the steps of:

preparing a casing having a first end, a second end, a first hole having a first diameter and a first axis, and a second hole having a second diameter smaller than said first diameter and a second axis offset from said first axis, said second hole communicating with said first hole;

inserting a lens from said first end of said casing into said first hole of said casing, and fixing said lens at a given position;

inserting a ferrule having a slant polished first end, a second end, and an optical fiber embedded therein from said second end of said casing into said second hole of said casing so as to satisfy a positional relation that a given distance is defined between said first end of said ferrule and said lens and that a portion of said first end of said ferrule radially farthest from said first axis of said first hole becomes axially farthest from said lens; and

fixing said ferrule.

10. (Withdrawn) An assembling method according to claim 9, wherein:

said casing further has a third hole for making communication of said first and second holes between said lens and said ferrule with the ambient air;

said assembling method further comprising the step of closing said third hole.

11. (Amended) A laser diode module, comprising:

a laser diode; and

a lens-fiber assembly including a casing having a first casing hole and a second casing hole offset from said first casing hole, a lens fixed in said first casing hole, and an optical fiber provided in said second casing hole, said lens-fiber assembly guiding a laser beam emitted from said laser diode through said lens to said optical fiber;

said optical fiber being inserted and fixed in a ferrule press-fitted with said second casing hole.

12. (Amended) A laser diode module according to claim 11, wherein:

said ferrule has a first ferrule end inserted in said second casing hole and a second ferrule end projecting from said second casing hole, said first ferrule end of said ferrule being inclined a given angle with respect to an axial direction of said ferrule; and

one of the outer circumferential surface of said ferrule and a wall surface of said casing defining said second casing hole is formed with an axially extending guide rail, and the other is formed with an axially extending groove adapted to engage said guide rail.

13. (Amended) A laser diode module according to claim 11, wherein said casing further has a third casing hole for making communication of said first and second casing holes between said lens and said ferrule with the ambient air.

14. (Withdrawn) A manufacturing method for a lens-fiber assembly using a casing having a first hole for insertion of a lens, a second hole for insertion of a ferrule, said second hole communicating with said first hole and being offset from said first hole, and a third hole for making communication of said first and second holes between said lens and said ferrule with the ambient air, said manufacturing method comprising the steps of:

inserting said lens into said first hole and fixing said lens; and

press-fitting a given length of said ferrule into said second hole, said ferrule having an

optical fiber embedded therein.

Please add the following new claims

15. (New) A laser diode module, comprising:

a laser diode assembly comprising a laser diode and a holder with said diode fixed relative to said holder and said holder having a holder axis;

a lens-fiber assembly including a casing having a first casing end, a second casing end, a first casing hole having a first casing hole diameter and a first casing hole axis, and a second casing hole having a second casing hole diameter smaller than said first casing hole diameter and a second casing hole axis offset from said first casing hole axis, said second casing hole communicating with said first casing hole, a lens inserted and fixed in said first casing hole from said first casing end of said casing, and a ferrule with an optical fiber embedded therein, said ferrule having a slant polished first ferrule end and a second ferrule end, said ferrule being inserted and fixed in said second casing hole from said second casing end of said casing so that a given distance is defined between said first ferrule end of said ferrule and said lens and that said second ferrule end of said ferrule projects from said second casing end of said casing; and

a sleeve having a first sleeve end fixed to said holder and a second sleeve end to which said first casing end of said casing is fixedly inserted and having a sleeve axis;

said first end of said ferrule being positioned so that a portion of said first ferrule end of said ferrule radially farthest from said first casing hole axis of said first casing hole becomes axially farthest from said lens.